

REMARKS

Status of the Claims

Claims 1-11 and 13-28 are pending. In the present Response, claims 3-5, 9, 10, 13, and 14-23 are amended; and claims 29 and 30 are added. Thus, after entry of these amendments, claims 1-11 and 13-30 are presented for consideration.

Pursuant to the Office Action, claims 9, 10, and 14 are objected to for informalities. Claims 5 and 15-28 are rejected under 35 U.S.C. §112, first paragraph. Claims 3-9, 13, 15-17, 20-28 are rejected under 35 U.S.C. §112, second paragraph. Claims 22-28 are rejected under 35 U.S.C. §102 for allegedly being anticipated by U.S. Patent No. 5,792,903 to Hirschberg *et al.* (hereinafter "Hirschberg"). Applicants respectfully traverse all outstanding objections to the specification and claims and rejections of the claims.

Applicants note with appreciation the Examiner's comments regarding the claims and his helpful comments and suggestions to assist in claiming the invention with more particularity and clarity.

Support for the Claim Amendments

Applicants submit that the claim amendments presented herein more particularly describe the claimed invention and do not introduce new matter, support being found in the specification in general and in the claims as originally filed. For example, claims 3 and 4 (as well as claims 6-9 which depend therefrom) have been included to add the polynucleotides of claim 5. This addition, however, does not add new matter as the polynucleotides of claim 5 were contemplated to be within the scope of the invention and the claims directed to the vector, host cells, and processes were contemplated to include the polynucleotides of the invention. Support for the hybridization condition including the temperature can be found at least at page 18, last paragraph, of the specification. New claims 29 and 30 drawn to polynucleotide probes of the invention placed in plasmids and vectors can be found at least at page 9, lines 10-25, and page 30, line 22, to page 31, line 29, of the specification.

Objections to the Specification

Applicants herewith submit formal drawings to overcome the objections set forth on form PTO-948 included with Paper No. 7. Applicants respectfully submit that this objection can properly be withdrawn.

Objections to the Claims

Claims 9, 10, and 14 are objected to for informalities. Applicants have amended claims 9, 10, and 14 by incorporating the helpful suggestions made by the Examiner for overcoming the objections. Accordingly, Applicants submit that the objections to amended claims 9, 10, and 14 can properly be withdrawn.

Issues under 35 U.S.C. §112, second paragraph

Claims 5 and 15-28 are rejected under 35 U.S.C. §112, for allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

The Patent Office alleges that claim 5 is indefinite in that the claimed polynucleotide cannot have at least 70% identity to the complement of a polynucleotide that encodes a phosphatase if the limitation is to a polynucleotide that encodes a phosphatase. Applicants have amended claim 5 to obviate this rejection.

The Patent Office states that it is unclear if the Applicants are attempting to broaden rather than narrow the scope of the claims 15-17, 20, and 21 that depend from claims 1, 2, 5, 13, and 14, respectively. Applicants have amended claims 15-17, 20, and 21 to clarify the scope of the claims to obviate this rejection.

The Patent Office alleges that claim 15 is indefinite in the recitation of the hybridization conditions absent a temperature for the conditions. Applicants have amended claim 15 to obviate this rejection.

The Patent Office alleges that claims 16, 17, and 20-28 are indefinite in the recitation of "hybridizes with specificity" or "hybridizes under stringent condition" absent a statement of the conditions. Applicants have amended claims 16, 17, and 20-28 to obviate this rejection.

The Patent Office alleges that claims 18 and 19 are indefinite for allegedly being drawn to phosphatases of claims 10 and 11, wherein the phosphatases comprise at least 30 contiguous amino acid residues; thus, it is alleged, claims 18 and 19 do not further limit claims 10 and 11. Applicants have amended claims 18 and 19 to obviate this rejection.

In light of the amendments and remarks set forth above, Applicants respectfully request reconsideration and withdrawal of all the rejections under 35 U.S.C. §112, second paragraph.

Issues under 35 U.S.C. §112, first paragraph

Claims 3, 4, 6-9, 13, 15-17, and 20-28 are rejected under 35 U.S.C. §112, first paragraph, for allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The Patent Office alleges that claims 13, 3, 4, 6, 7, 8, and 9 are drawn to a genus of proteins, DNAs, and host cells that were not disclosed in the specification. While Applicants respectfully submit that claims 13, 3, 4, 6, 7, 8, and 9, as written, are described in the specification, Applicants have amended the claims to describe the claimed invention with more particularity and clarity. Accordingly, this rejection has been obviated.

The Patent Office alleges that while the polynucleotides of the instant invention (claims 15-17, 20, and 21) consisting of at least 15 contiguous bases of the polynucleotide which encodes SEQ ID NO:28 would maintain this function (of identifying polynucleotides that encode polypeptides having phosphatase activity), it remains to be seen if those polynucleotides comprising at least 15 contiguous bases of the polynucleotide which encode SEQ ID NO:28, wherein only the 15 contiguous bases maintain the usefulness as a "hybridization probe" would maintain the same function. (See page 8, last paragraph carried over to page 9, of the Office

Action.) Applicants have amended claims 15-17, 20, and 21 to describe the claimed invention with more particularity and clarity. Accordingly, this rejection has been obviated.

The Patent Office alleges that with respect to phosphatases having 30 contiguous amino acids of an amino acid which is at least 70% identical to SEQ ID NO:28, the genus of phosphatases having 30 contiguous amino acids of an amino acid sequence which is at least 70% identical to SEQ ID NO:28 is far larger than the genus of phosphatases that have 70% identity to SEQ ID NO:28.

Applicants respectfully submit that it is not the size of the genus that determines whether a claim meets the written description requirement, but rather whether one of ordinary skill in the art would have recognized, based on her knowledge and experience, that Applicants were in possession of the claimed invention at the time of filing. Thus, claims 18 and 19, directed to fragments of at least 30 amino acids having phosphatase activity (function) and having at least 70% identity to a corresponding number of contiguous amino acids of the sequence set forth in SEQ ID NO:28 (structure) are supported by the specification. While Applicants are not questioning the Examiner's understanding of the invention, if it would be of benefit, Applicants could rewrite claims 18 and 19 to describe the invention in terms of the function and structure as set forth above in independent form. Applicants respectfully request reconsideration and withdrawal of the rejection.

Claims 3, 4, 6-9, 13, 15-17, and 20-28 are rejected under 35 U.S.C. §112, first paragraph, for allegedly not enabling the claimed invention. The Patent Office alleges that while the specification enables enzymatically active proteins having the amino acid sequence at least 70% identical to SEQ ID NO:28 or enzymatically active fragments thereof, as well as polynucleotides which encode these proteins, it does not reasonably provide enablement for those proteins which merely comprise 30 amino acids of SEQ ID NO:28 or the polynucleotides which encode said proteins. (See page 9, last paragraph, of the Office Action.)

Applicants respectfully disagree. Once armed with the sequence (nucleic acid or peptide) disclosed in the specification, one of ordinary skill in the art could then choose 30 contiguous

amino acids of the sequence, create a polynucleotide encoding the 30 contiguous amino acid sequence (exemplary methods include enzyme restriction digest, oligonucleotide synthesis, or PCR), put it into an expression vector, express the polypeptide and test the polypeptide for activity. Even simpler, one of ordinary skill in the art could create the 30 amino acid polypeptide by, for example, protein synthesis. Therefore, Applicants aver that creating and testing polypeptides for phosphatase activity from a template sequence would not be undue experimentation for the skilled artisan.

The Patent Office alleges that claims 3, 4, 6-9, and 13 are so broad as to encompass any polynucleotides having at least 70% identity to a polynucleotide that encodes SEQ ID NO:28. Applicants have amended claim 13 to obviate this rejection.

The Patent Office alleges that claims 15-17, 20, and 21 are so broad as to encompass any polynucleotide comprising at least 15 bases of a polynucleotide that hybridizes with specificity to a polynucleotide that encodes a phosphatase. Applicants have amended claims 15-17, 20, and 21, setting forth specified hybridization conditions (hybridization being a physical/chemical property of the fragments) and , to more particularly describe the claimed fragments, thereby, obviating this rejection.

The Patent Office alleges that claims 22-28 are so broad as to encompass any polynucleotide probe comprising any nucleic acid sequence consisting of a sequence that hybridizes to a polynucleotide encoding a polypeptide of SEQ ID NO:28 or at least 90% identical to SEQ ID NO:28. Applicants have amended claims 22-28, setting forth specified hybridization conditions to obviate this rejection.

The Patent Office alleges that the above claims are rejected under 35 U.S.C. §112, first paragraph, because there is minimal structural and no functional limits on the claimed polynucleotides. (See page 10, lines 13-15, of the Office Action.) Applicants respectfully submit that they have provided structure (the sequence) and a functional limit, those that encode a polypeptide having phosphatase activity, or probes that can be used to hybridize under specified conditions to polynucleotides encoding polypeptides having phosphatase activity, as

well as a physical/chemical property of the claimed polynucleotide fragments and probes. Therefore, polynucleotides having structures outside the limitations of the claims and those that do not have the proper function or physical/chemical properties are not being claimed in the present invention. While the skilled artisan may need to conduct routine experimentation, it would not be undue experimentation, the standard for which has been set out in the Response filed July 22, 2002. That it is not undue experimentation is evidenced by the fact that such methodologies and techniques are used by people of ordinary skill in the art in laboratories throughout the world. Accordingly, Applicants submit that amended claims 3, 4, 6-9, 13, 15-17, and 20-28 are enabled by the specification.

Claim 5 is rejected under 35 U.S.C. §112, first paragraph, for allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Patent Office alleges that the deposit is not fully disclosed or shown to be publicly known and freely available. Applicants refer the Patent Office to page 13, third full paragraph, for the required language. Accordingly, Applicants respectfully submit that this rejection can properly be withdrawn.

In light of the amendments and remarks set forth above, Applicants respectfully request reconsideration and withdrawal of all the rejections under 35 U.S.C. §112, first paragraph.

Issues under 35 U.S.C. §102

Claims 22-28 are rejected under 35 U.S.C. §102(e) for allegedly being anticipated by Hirschberg.

As stated in the Office Action, Hirschberg teaches a purified and isolated DNA sequence encoding lycopene cyclase. The cDNA is a 4928 basepair sequence with an open reading frame from 2029-3261 of SEQ ID NO:1. Approximately 2000 bps upstream of the lycopene cyclase open reading frame is a region from nucleotide 1506 to 1522 (17 nucleotides) that is 100% identical to SEQ ID NO:19. Therefore, the Patent Office alleges that Hirschberg teaches an isolated polynucleotide (probe) comprising a nucleic acid sequence consisting of a sequence that

hybridizes under stringent conditions to a polynucleotide (SEQ ID NO:19) encoding a polypeptide sequence of SEQ ID NO:28. It is further alleged that Hirschberg also teaches a polynucleotide probe further comprising a sequence of at least 150 bases, rendering claims 22-28 anticipated.

Applicants respectfully submit that Hirschberg discloses a 4928 base pair sequence of DNA for lycopene cyclase, having a region of 17 nucleotides with 100% identity to a region of SEQ ID NO:19, located about 2000 bases upstream of the lycopene cyclase coding region. There is no teaching in Hirschberg that would indicate to one of ordinary skill in the art that the Hirschberg 4928 base pair sequence would be desirable to use as a probe for polynucleotides that encode polypeptides having phosphatase activity. There is no teaching in Hirschberg which of the 4928 bases would be useful as a probe that would hybridize to a polynucleotide that encodes a polypeptide having phosphatase activity under the stated conditions.

Moreover, Hirschberg does not teach a polynucleotide probe wherein the nucleic acid sequence consists of a sequence that hybridizes to a polynucleotide encoding a polypeptide having phosphatase activity. The disclosed sequence of Hirschberg has only 17 bases that are 100% identical to SEQ ID NO:19 in a 4928 base probe. Accordingly, Applicants submit that Hirschberg does not teach a probe having a nucleic acid sequence that consists of a sequence that hybridizes to a polynucleotide having phosphatase activity under the stated conditions.

For these reasons, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 22-28 under 35 U.S.C. §102(e) as allegedly anticipated by Hirschberg.

CONCLUSION

Applicants request that the Examiner reconsider the application and claims in light of the foregoing remarks and amendments and respectfully submit that the claims are in condition for allowance.

If, in the Examiner's opinion, a telephonic interview would expedite the favorable prosecution of the present application, the undersigned attorney would welcome the opportunity

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Serial No. : 09/202,681
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Page : 13

Attorney's Docket No.: 09010-045US1

to discuss any outstanding issues and to work with the Examiner toward placing the application in condition for allowance.

Attached is a marked-up version of the changes being made by the current amendment.

Applicants have included a check for the excess claims fee. Applicants believe that no additional fees are necessitated by the present Response. However, in the event any such fees are due, the Commissioner is hereby authorized to charge any such fees to Deposit Account No. 06-1050.

Respectfully submitted,

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Version with markings to show changes made

In the claims:

Claims 3-5, 9, 10, 13, and 14-23 have been amended as follows:

3. (Twice Amended) The polynucleotide of claims 1, 2, 5, 13, or 14, wherein the polynucleotide is DNA.
4. (Twice Amended) The polynucleotide of claims 1, 2, 5, 13, or 14, wherein the polynucleotide is RNA.
5. (Twice Amended) An isolated polynucleotide [encoding a thermostable phosphatase, or an enzymatically active fragment thereof, comprising a polynucleotide having at least 70% identity to a member] selected from the group consisting of:
 - (a) a polynucleotide having phosphatase activity and having at least 70% identity to a polynucleotide encoding an enzyme having phosphatase activity [encoded by the DNA] contained in ATCC Deposit No. 97379, or enzymatically active fragments thereof, wherein said enzyme is obtained from *Ammonifex degenesii* KC4; and
 - (b) a polynucleotide complementary to the polynucleotide of (a).
9. (Twice Amended) A process for producing a recombinant cell comprising: transforming or transfecting [the] a cell with the vector of claim 6 such that the cell expresses the polypeptide encoded by the DNA contained in the vector.
10. (Thrice Amended) A thermostable phosphatase of which at least a portion is encoded by a polynucleotide of claim 14 and wherein the thermostable phosphatase comprises an amino acid sequence which is at least 70% identical to [an] the amino acid sequence as set forth in SEQ ID NO: 28.

13. (Amended) An isolated polynucleotide selected from the group consisting of:

(a) a polynucleotide encoding a polypeptide having phosphatase activity and having at least 70% identity to a polynucleotide that encodes the polypeptide sequence of SEQ ID NO:28, or enzymatically active fragments thereof[, wherein the polypeptide has phosphatase activity]; and

(b) a polynucleotide complementary to (a).

14. (Amended) An isolated polynucleotide selected from the group consisting of:

(a) a polynucleotide that encodes a polypeptide having at least 70% identity to SEQ ID NO:28[.] or enzymatically active fragments thereof, wherein the polypeptide has phosphatase activity; and

(b) a polynucleotide complementary to (a).

15. (Amended) A polynucleotide fragment having a length of [The isolated polynucleotide of claim 1, wherein the group further consists of a polynucleotide comprising] at least 15 nucleotides, wherein the nucleotides are contiguous bases of the polynucleotide of claim 1 [(a) or (b)] and hybridizes with specificity to a polynucleotide that encodes a polypeptide having activity as a phosphatase, or an enzymatically active fragment of the phosphatase, or its complement under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

16. (Amended) A polynucleotide fragment having a length of [The isolated polynucleotide of claim 2, wherein the group further consists of a fragment of (a), (b) or their complements that are] at least 15 nucleotides, wherein the nucleotides are contiguous bases of the polynucleotide of claim 2 or its complement [in length] and hybridizes with specificity to a polynucleotide that encodes a phosphatase, or an enzymatically active fragment of the phosphatase, or its complement, under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

17. (Amended) A polynucleotide fragment having a length of [The isolated polynucleotide of claim 5, wherein the group further consists of a polynucleotide comprising] at least 15 nucleotides, wherein the nucleotides are contiguous bases of the polynucleotide of claim 5 [(a) or (b)] and hybridizes with specificity to a polynucleotide that encodes a polypeptide that has phosphatase activity or its complement under, hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

18. (Amended) An enzymatically active fragment of [T]the thermostable phosphatase of claim 10, wherein the fragment [phosphatase] comprises at least 30 contiguous amino acid residues and has phosphatase activity.

19. (Amended) An enzymatically active fragment of [T]the phosphatase enzyme of claim 11, wherein the fragment [phosphatase] comprises at least 30 contiguous amino acid residues and has phosphatase activity.

20. (Amended) A polynucleotide fragment having a length of [The isolated polynucleotide of claim 13, wherein the group further consists of a polypeptide comprising] at least 15 nucleotides, wherein the nucleotides are contiguous bases of the polynucleotide of claim 13 [(a) or (b)] and hybridizes with specificity to a polynucleotide that encodes a polypeptide that has phosphatase activity or its complement, under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

21. (Amended) A polynucleotide fragment having a length of [The isolated polynucleotide of claim 14, wherein the group further consists of a polynucleotide comprising] at least 15 nucleotides, wherein the nucleotides are contiguous bases of the polynucleotide of claim 14 [(a) or (b)] and hybridizes with specificity to a polynucleotide that encodes a polypeptide that has phosphatase activity or its complement, under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

22. (Amended) A polynucleotide probe comprising a nucleic acid sequence consisting of a sequence that hybridizes under stringent conditions to a polynucleotide encoding a polypeptide sequence of SEQ ID NO:28[, or a] or its complement [thereof], under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.

23. (Amended) A polynucleotide probe comprising a nucleic acid sequence consisting of a sequence that hybridizes to a polynucleotide encoding a polypeptide having phosphatase activity and having at least 90% identity to the sequence of SEQ ID NO:28, or [a] its complement [thereof], under hybridization conditions comprising 0.9M NaCl, 50 mM NaH₂PO₄, and 0.5% SDS at 45°C.